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【DESCRIPTION】

【Invention Title】

BUCKLING STRENGTHENED SHIPPING CONTAINER

【Technical Field】

The present invention relates, in general, to shipping containers and, more particularly, to a buckling strength reinforced shipping container, capable of reducing the risk of the container being damaged by external impacts by adding buckling strength reinforcing frames, which can withstand torsional and angular loads, to each of a panel on which a door is formed and another panel opposite it.

【Background Art】

Generally, the purpose of a transportation container is to make freight unitary. To facilitate stacking up, containers usually used for transportation of freight have a right hexahedral shape having a standardized fixed size.

The container enables general merchandise and special freight to be easily transported without external packing, thereby saving time and expense, and preventing mishaps in the course of transportation, such as damage to the freight and loss or theft of the freight. In addition, since loading of the freight on freight cars, automobiles, ships, etc. can be performed by a machine rather than by human power, there is an advantage that loading and unloading operations become easy and save time.

According to the intended use, the container is classified into a dry container which is a closed-type for the purpose of transporting general freight, a reefer container with a high heat insulation capacity, used in transporting frozen food and equipped with a freezing device, an open top container whose top wall can be opened from the upper ends of both sidewalls and thereby is able to be top loaded, a flat rack container having only the bottom structure, which is provided by removing the top wall and all the sidewalls from a dry container, thus

being adaptable to long and tall freight, a bulk container having excellent heat insulation and airtightness, used in transportation of oxidizable substances, a tank container equipped with a tank to be used for transporting liquid oxidizable substances, and a pen container having windows on the sidewalls in all directions and used for transporting animals.

Among the above-mentioned containers, the dry container has been the most widely used in transportation by land or by ship, and thus, a conventional dry container will be described with reference to FIG. 1.

FIG. 1 is a perspective view illustrating a conventional shipping container according to the related art.

As illustrated, the conventional container 100 has a substantially right hexahedral shape, comprising an upper rail frame 111 and a lower rail frame 112, both of which constitute rectangular frame structures on the upper and lower parts of the container, respectively. At a predetermined position on the lower rail frame 112 may be provided a pocket (not shown) according to the type of container, into which the forks of a loading device can be inserted so as to move the container.

At the corners of the upper rail frame 111 and the lower rail frame 112 respectively are vertically oriented corner posts 110, which are coupled to the frame structures of the upper and lower rail frames and form the framework of the container 100.

Each of the corner posts 110 is fabricated by processing and welding the pieces of a shot-blasted steel plate which is a hot rolled steel plate, 4mm to 10mm thickness, together to form a rectangular column. The corner posts 110 withstand a vertical load and allow a plurality of containers 100 to be stacked one on top of another. The corner posts 110 may be integrally formed with a casting, to which a hooking device of a crane is connected (not shown).

Uneven surface panels 113, which have angled ridges and angled channels, are

respectively set in and between the upper rail frame 111 and the lower rail frame 112, thus forming a top wall, a bottom wall, two sidewalls, and front and rear walls of the container 100. As illustrated in the drawing, the uneven surface panels having the angled ridges and angled channels are formed by bending steel plates having a predetermined thickness in a predetermined corrugated shape, thereby increasing the structural strength of the panels 113.

The shipping container 100, constructed as described above, is stacked up using a loading/unloading device, such as a crane. For one container ship, about nine containers 100 may be stacked up inside the hold of the ship, and five or six containers may be loaded on the deck, and then bound using a tie.

However, in view of the structure of the conventional shipping container, the container 100 has relatively good structural strength capable of withstanding a compressive load in a vertical direction due to the corner posts 100, but does not efficiently withstand a torsional load or an angular load. In other words, as depicted in FIG. 2, a ship must have a sealed structure, which accomplishes airtightness and watertightness against wind and rain and efficiently resists and withstands various and complicated loads in nature because it must move on the irregular surface of the sea. As the ship sails on turbulent seas, the ship undergoes complex fluctuations including rolling, in which the ship rolls to the left and right due to waves, pitching by which the ship pitches to the front and back, yawing by which the ship yaws to the left and right, and heaving, by which the ship moves vertically.

The complex fluctuations applied to the ship also act on the freight loaded on the ship. Even in the case of the freight being loaded in containers which are stacked up and loaded in and on a ship, a variety of loads, such as vertical loads, horizontal loads and angular loads caused by complex fluctuations, are applied to the freight, thereby causing damage to the freight.

Thus, to reduce damage to the freight that is loaded on the top deck of a ship to the minimum possible, it may be necessary to limit the weight of the freight loaded in the container or to securely bind the container using a tie. However, this causes inefficiencies in economy and time.

【Disclosure】

【Technical Problem】

Accordingly, the present invention has been made keeping in mind the above problems occurring in the prior art, and an object of the present invention is to provide a buckling strength reinforced shipping container, capable of reducing the risk of the container being damaged by external impacts, increasing the weight of the loaded freight that can be stowed therein, and enhancing the degree of freedom of binding, by adding buckling strength reinforcing frames to each of a panel, on which a door is formed, and to another panel opposite thereto, that can withstand torsional load and angular load.

【Technical Solution】

In order to achieve the above object, according to one aspect of the present invention, there is provided a buckling strength reinforced shipping container, comprising: an upper rail frame and a lower rail frame, each having a rectangular frame shape, respectively mounted in an upper part and a lower part of the container, and a plurality of corner posts to withstand vertical load by vertically connecting four corners of the upper rail frame to those of the lower rail frame, thereby forming a framework of the container; a roof panel and a floor panel forming a ceiling and a bottom wall of the container, side panels forming sidewalls, and a front panel and a rear panel forming a front wall and a rear wall of the container, all of which are formed with uneven surfaces and combined in and between the upper rail frame and the lower rail frame; and buckling strength reinforcing frames each provided in an X-shaped arrangement on each of the front panel and the rear panel, each terminal end of which is

positioned in the corner portions, at which the corner posts and the upper and lower rail frames are connected together, thereby withstanding torsional load and angular load.

In an aspect, the buckling strength reinforcing frames may be mounted by welding to the corner posts and the upper and lower rail frames respectively, with both of which the terminal ends of the buckling strength reinforcing frames are in contact.

In another aspect, either of the front panel or the rear panel may be formed with a double door-type side opening/closing door, and the buckling strength reinforcing frame provided on the panel forming the door may be provided with a separated shape and mounted by welding to the panel, so as to avoid positional interference between the door and the reinforcing frame when the door is opened and closed.

Another object of the present invention is to provide a buckling strength reinforced container that can be easily opened and closed without decreasing the strength of the buckling strength reinforcing frames provided on the door panel.

A buckling strength reinforced shipping container according to another embodiment of the present invention, comprises: an upper rail frame and a lower rail frame having rectangular frames shape respectively mounted in an upper part and a lower part of the container, and corner posts to withstand vertical load by vertically connecting four corners of the upper rail frame to those of the lower rail frame together, thereby forming a framework of the container, a roof panel and a floor panel forming a ceiling and a bottom wall, side panels forming sidewalls, and a front panel and a rear panel forming a front wall and a rear wall, all of which are formed with uneven surfaces and combined in and between the upper rail frame and the lower rail frame; left and right doors provided in either of the front panel or the rear panel, one side of each of which is coupled by a hinge to the corner posts; buckling strength reinforcing frames each provided in an X-shaped arrangement on each of the front panel and the rear panel, each terminal end of which is positioned in corner portions, at which the

corner posts and the upper and lower rail frames are connected together, thereby withstanding torsional load and angular load, wherein the buckling strength reinforcing frame on the door is partitioned into left and right frames provided on the left and right doors based on an intersecting point of the left and right frames; and fastening means provided at the intersecting point of the left and right frames to selectively form a continuous structure using an engagement structure.

In an aspect, the fastening means may comprise: an engaging hole having a depressed triangular shape, formed in one of the left and right frames based on the intersecting point of the buckling strength reinforcing frame provided on the door; and an engaging device provided in a remaining one of the left and right frames at a position facing the engaging hole, including an actuating bolt rotatably installed within a housing which is open toward the engaging hole, a manipulation lever coupled in worm and worm gear engagement with a first end of the actuating bolt, and an engaging part coupled by a screw with a second end of the actuating bolt and rectilinearly moving within the housing when the actuating bolt rotates, whereby a leading edge of the engaging part advances and comes into engagement with the engaging hole.

In another aspect, the left and the right frames provided on the door may be positioned on inner surfaces of the left and the right doors and mounted thereto through welding, and terminal ends thereof may engage at intervals with the corner portions, at which the corner posts and the upper and lower rail frames are connected together.

【Description of Drawings】

FIG. 1 is a perspective view illustrating a conventional shipping container according to the related art;

FIG. 2 is a conceptual view to explain the complex fluctuations applied to a ship;

FIG. 3 is a perspective view illustrating a shipping container according to the present invention;

FIG. 4 is a side view of the container viewed in "A" of FIG. 3;

FIG. 5 is a side view of the container viewed in "B" of FIG. 3;

FIG. 6 is a perspective view showing the main portion of the container viewed from the outside of a door according to the present invention;

FIG. 7 is a perspective view showing the main portion of the container viewed from the inside of the door according to the present invention; and

FIGS. 8 and 9 are sectional views to explain the fastening means according to the present invention.

<Description of Symbols for Important Parts in Drawings>

1:Container	10:Corner post
11:Upper railframe	12:Lower rail frame
12': Pocket	13:Top panel
14:Side panel	15:Front panel
16:Rear panel	16a, 16b: Left and right doors
20, 30:Buckling strength reinforcing frames	
31:Left frame	32:Right frame
40:Fastening means	41:Engaging hole
45:Engaging device	46:Housing
47:Actuating bolt	48:Manipulation lever
49:Engaging part	

【Best Mode】

Hereafter, preferred embodiments of the present invention will be described with reference to the accompanying drawings.

The present invention relates to a shipping container. More particularly, the present invention relates to a buckling strength reinforced shipping container, wherein buckling strength reinforcing frames to withstand torsional load and angular load are additionally provided on a front panel and a rear panel, thereby reducing the risk of damage to the container because of complex fluctuations applied to the ship while sailing.

As illustrated in FIG. 3, the buckling strength reinforced shipping container according to the present invention comprises an upper rail frame 11 having a rectangular shape and a lower rail frame 12 formed with pockets 12'. The upper rail frame 11 and the lower rail frame 12 are disposed and spaced apart from each other at a predetermined interval in a vertical direction. On the four corners of the upper rail frame 11 and the lower rail frame 12 are disposed corner posts 10, the framework of the container being formed by integrating the frames 11 and 12 and the four corner posts 10 into a single structure. Each of the corner posts 10 is formed by processing and welding the pieces of a steel plate, having a predetermined thickness, into a single structure having a rectangular column shape. The corner posts 10 efficiently withstand a vertical load applied to the container in a vertical direction, and allow a plurality of containers 1 to be stacked up. Each of the corner posts 10 has a structure comprising a casting, to which the hooking device of a crane can be coupled. The corner posts 10 are integrally combined with the upper rail frame 11 and the lower rail frame 12 through welding.

The framework of the container 1, which is fabricated in the right hexahedral shape, is as a whole covered with a board-type roof panel 13 and a floor panel (not shown), two side panels 14, a front panel 15, and a rear panel 16, on which angled ridges and angled channels are alternately formed at regular intervals by bending the panels. The angled ridges and angled channels, alternately formed on each of the roof panel 13, the floor panel (not shown), the side panels 14, the front panel 15 and the rear panel 16, are designed to increase the

strength of the container 1 to resist external impact. As shown in this drawing, the side panels 14, the front panel 15 and the rear panel 16 are formed to increase the structural strength of the container 1 to efficiently withstand a vertical load applied in a vertical direction. In the same manner, the roof panel 13 and the floor panel (not shown) are formed to increase the structural strength of the container 1 to efficiently withstand a horizontal load applied to the container 1 in a horizontal direction.

At least one of the front panel 15 and the rear panel 16 is integrally formed with a double door-type side opening/closing door. In the present invention, the side opening/closing door is preferably formed on the rear panel 16.

A main feature of the container having the above-mentioned configuration lies in that a buckling strength reinforcing frame is added to each of the front panel 15 and the rear panel 16, to increase the structural strength to withstand a torsional load and an angular load applied to the container upon complex fluctuations of a ship, thereby reducing damage to and breakage of the container, protecting the freight stowed in the container, and increasing the operational reliability of the container.

For this, in the shipping container 1 of the present invention, two buckling strength reinforcing frames 20 and 30 are respectively added to the front panel 15 and the rear panel 16 forming the door, as illustrated in FIGS. 4 and 5. The buckling strength reinforcing frames 20 and 30 are designed to maintain high strength to efficiently withstand torsional load and angular load applied to the container 1. Each of the reinforcing frames 20 and 30 is fabricated in an X-shaped profile and added to each of the front panel 15 and the rear panel 16 which are respectively provided on the front and rear ends of the container 1.

The construction of the buckling strength reinforcing frames 20 and 30 will be described in more detail with reference to the installation position.

As illustrated in FIG. 4, to fabricate the buckling strength reinforcing frame 20 provided on the front panel 15, pipes having a predetermined thickness may be disposed to cross each other, thus forming an X-shaped arrangement prior to welding the intersecting point of the pipes together to form an X-shaped frame. Alternatively, rectangular pipes, formed by bending a metal plate having a predetermined thickness in the form of a rectangular column, may be disposed to cross each other and form an X-shaped arrangement prior to welding the intersecting points of the pipes together to form an X-shaped frame, and the terminal ends thereof are formed with a horizontal surface and a vertical surface to be perpendicular to each other.

The buckling strength reinforcing frame 20, provided on the front panel 15, is in close contact with corner portions, at which two front corner posts 10, the upper rail frame 11 and the lower rail frame 12 are connected together. In the above state, the terminal ends of the reinforcing frame 20 are brought into close contact with and are welded to the corner portions. When necessary, the reinforcing frame 20 may also be joined with the front panel 15 through welding. That is, the buckling strength reinforcing frame 20, integrally combined with the front panel 15, is disposed in the form of a cross, and the terminal ends thereof are joined with the corner portions of the framework of the container through welding, to which the corner posts 10, the upper rail frame 11 and the lower rail frame 12 are connected, thereby increasing the structural strength of the framework of the container in the directions of application of a torsional load and an angular load.

As illustrated in FIG. 5, in the buckling strength reinforcing frame 30 provided on the rear panel 16, on which the door is provided, pipes, each having predetermined thickness and length, are arranged to form an X-shaped arrangement, but the X-shaped frame 30 is divided into two parts along a vertical line at the middle portion thereof, i.e., the middle portion is in the form of "> <" so as to avoid positional interference which may be caused by the relative

position between the reinforcing frame 30 and the door when the door is opened or closed. The door provided on the rear panel 16 has the shape of a double door-type side opening/closing door which has been typically applied to general-type containers. As the structure of this side opening/closing door, a variety of conventional structures well-known to those skilled in the art may be employed without affecting the functionality of the present invention. Thus, a detailed description thereof will be omitted herein.

As illustrated, the buckling strength reinforcing frame 30, provided on the panel forming the door, may be provided outside or inside the container. The terminal ends of the buckling strength reinforcing frame 30, provided on the panel forming the door, each have a horizontal surface and a vertical surface which are perpendicular to each other. These terminal ends correspond in shape, so that the terminal ends can be positioned at regular intervals on the corner portions, at which the corner posts 10, the upper rail frame 11 and the lower rail frame 12 are connected, and are joined by welding on the rear panel forming the door. That is, the terminal ends of the buckling strength reinforcing frame 20 provided on the front panel 15 can be joined by welding, but those of the buckling strength reinforcing frame 30 provided on the rear panel 16 forming the door are positioned to define intervals in the corner portions, at which the upper rail frame 11 and the lower rail frame 12 are connected so as not to cause positional interference between the terminal ends and the corner portions while the door is opened or closed.

As described above, the buckling strength reinforcing frame 30, provided integrally on the rear panel 16, is disposed in a cross form and the terminal ends thereof are provided in a form such that they engage in the corner portions where the corner posts 10, the upper rail frame 11 and the lower rail frame 12 are connected, thereby increasing the structural strength of the framework of the container, so that the container efficiently resists torsionally applied and angularly applied loads.

The buckling strength reinforcing frame 30, provided on the rear panel 16 forming the door, is preferably provided to have a structure such that the structural continuity of the buckling strength reinforcing frame 30 can be maintained when the door is closed, without causing positional interference when the door is opened and closed.

For this, the present invention proposes preferred embodiments illustrated in FIGS. 6 through 9.

FIG. 6 is a perspective view showing the main portion of a container viewed from the front side of a door according to the present invention, FIG. 7 is a perspective view showing the main portion of the container viewed from the rear side of the door according to the present invention, and FIGS. 8 and 9 are sectional views to explain a fastening means according to the present invention.

As illustrated, the rear panel 16 is provided with left and right doors 16a and 16b, each of which is coupled by hinges to an associated corner post 10, so that the doors 16a and 16b can be opened and closed around the hinges. Inside the left and right doors 16a and 16b, the X-shaped buckling strength reinforcing frame 30 is integrally coupled through welding.

The buckling strength reinforcing frame 30, provided on the panel forming a door, is partitioned into a left frame 31 provided on the left door 16a and a right frame 32 provided on the right door 16b, based on the intersecting point of the reinforcing frame 30. The left and right frames 31 and 32 are positioned on and welded to the respective inner surfaces of the left and right doors 16a and 16b. Each terminal end of the frames 31 and 32 engages with a corner portion, in which a corner post 10 and the upper and lower rail frames 11 and 12 are connected, and is spaced apart from the corner portion by an interval.

The left frame 31 and the right frame 32 each additionally have a fastening means 40 at the intersecting point thereof, thus allowing the doors 16a and 16b to be opened or closed at the point where the frames 31 and 32 intersect. Thus, the structural continuity of the container is ensured.

The fastening means 40 is designed to selectively maintain the left frame 31 and the right frame 32 as a continuous structure using an engaging structure. The fastening means 40 comprises an engaging hole 41 formed on either of the left frame 31 or the right frame 32, and an engaging device 45 provided in the other frame at a position opposite the engaging hole 41. In the present invention, the engaging hole 41 and the engaging device 45 are formed in the left frame 31 and the right frame 32 respectively, but their positions may be changed.

The engaging hole 41 is formed in the left frame 31, at the intersecting point of the buckling strength reinforcing frame 30, has a depressed triangular shape which extends toward the left door 16a, and has a leading angle, based on the boundary surface, on which the left and right doors 16a and 16b intersect, as seen in FIG. 4.

The engaging hole 41 selectively engages with an engaging part 49 of the engaging device 45 provided in the right frame 32.

The engaging device 45 is mounted on the right frame 32 at a position opposite the engaging hole 41. The engaging device 45 comprises a box-shaped housing 46, the side thereof facing the engaging hole 41 being opened. Inside the housing 46 is horizontally disposed an actuating bolt 47 which is rotatable.

One end of the actuating bolt 47 is coupled with a manipulation lever 48 to be rotated by a user through worm and worm gear engagement. By rotating the manipulation lever 48 forward or backward, the actuating bolt 47 cooperating with the lever 48 is also rotated forward or backward. The other end of the actuating bolt 47 is engaged by a screw with the

engaging part 49 which corresponds in shape to the engaging hole 41, so that the engaging part 49 is brought into close engagement with the engaging hole 41. The engaging part 49, provided inside the housing 46, rectilinearly moves according to forward and backward rotation of the actuating bolt 47, thereby selectively engaging with the engaging hole 41 or disengaging from the engaging hole 41.

The fastening means 40 will be operated as follows.

When the doors 16a and 16b are closed, a user first rotates the manipulation lever 48 in one direction, in order to release the structural continuity of the buckling strength reinforcing frame 30 and thereby open the doors 16a and 16b. Coupled with the manipulation lever 48 in worm and worm gear engagement, the actuating bolt 47 is rotated in one direction and, at the same time, the engaging part 49, coupled by a screw to the leading edge of the actuating bolt 47, moves along the spiral screw of the actuating bolt 47, and as a consequence, the engaging part 49 is retracted from the engaging hole 41.

At this time, when the engaging part 49 of the fastening means 40 becomes completely disengaged from the engaging hole 41, the manipulation force which has been applied to the manipulation lever 48 is released so that the operation of releasing the structural continuity of the buckling strength reinforcing frame 30, which is partitioned into left and right frames 31 and 33, is completed.

As described above, to maintain the structural continuity of the buckling strength reinforcing frame using the fastening means 40 under the condition that the engaging part 49 is disengaged from the engaging hole 41, the manipulation lever 48 is rotated reversely a predetermined number of times when the left and right doors are closed. Then, the actuating bolt 47 is reversely rotated in conjunction with the manipulation lever 48 so that the engaging part 49, engaging by a screw with the actuating bolt, is moved to the engaging hole 41. At this time, when the engaging part 49 entirely contacts with and engages in the engaging hole

41, the manipulation force which has been applied to the manipulation lever 48 is interrupted so that the operation for maintaining the structural continuity of the buckling strength reinforcing frame is completed.

As described above, the shipping container 1 according to the present invention enjoys increased overall strength of the framework thereof due to the construction thereof on which the X-shaped buckling strength reinforcing frames 20 and 30 are additionally mounted on the front panel 15 and the rear panel 16 which forms the door. Especially, the ability to efficiently withstand torsional load and angular load can be reliably ensured.

The buckling strength reinforcing frame 30 provided on the door is partitioned into left and right frames 31 and 32, and the fastening means 40 to selectively maintain or release the structural continuity of the buckling reinforcing frame 30 when the manipulation force is applied by the user is additionally mounted on the separated left and right frames 31 and 32. Thus, the ability to withstand torsional load and angular load applied to the door can be reliably recovered.

The following Table 1 compares the ability to withstand a side load of the present invention with the ability to withstand a side load according to the conventional art, based on a 20 ft container (ISO type - 20') for international shipping transportation, which is in wide use.

【Table 1】

	Conventional Art	Present Invention
	24,000kg	24,000kg
	192,000kg	192,000kg
	15,000kg	45,000kg

Referring to this figure, the conventional general-type container can endure 24 tons x 8 layers = 192 tons, so that 8 layers can be stacked in the general-type container, but the conventional container only endures a side load up to 15 tons. Unlike the conventional container, the container of the present invention, to which the buckling strength reinforcing frame is added, is expected to increase the strength by 33 tons.

The buckling strength reinforced shipping container according to the present invention may be employed as containers having various uses and shapes. That is, as long as it has a structural feature that the buckling strength reinforcing frame can be applied to, the present invention may be adapted to a variety of containers, including a dry container or an open top container, without affecting the functionality of the present invention.

【Industrial Applicability】

Referring to the construction and operation described above, the buckling strength reinforced shipping container according to the present invention can imparted with greatly increased ability to withstand torsional load and angular load by additionally mounting buckling strength reinforcing frames on the front and rear panels of the container, thereby greatly reducing deformation and damage to the container caused by external impact.

Accordingly, as the allowable load increases as a result of the shipping container being strengthened, the load limitation to freight stowed therein is increased, thereby being capable of loading more freight than in the past. In addition, the container of the present invention does not require additional binding using a tie, so that the container has a very useful effect of being economical as a result.

Although a preferred embodiment of the present invention has been described for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claim.